Rapid Response Brief

Feb 2022

What can research evidence tell us about:

Strategies to control the transmission of SARS-CoV-2 in Ugandan schools

Key messages

Although the transmission of SARS-CoV-2 is lower in schools than the communities, it is essential to consider the following to control outbreaks and prevent hospitalisations:

- **Strategies to physically interrupt within school transmission of SARS-CoV-2**
  1. Covid-19 vaccination
  2. Physical interruption of the transmission mechanisms: face masks, hand hygiene practices, and disinfecting surfaces
  3. Changes in the environment to reduce risk of spreading SARS-CoV-2: reduce class size, physical distancing, and ventilation
  4. Testing strategies, such as regular or one-time testing and symptom screening
- **Additional strategies to adjust and or complement mitigation strategies**
  1. It is unnecessary to close schools even during moderate to high-intensity community transmissions
  2. Where applicable, vaccination is the primary strategy for controlling Covid-19 transmissions in schools
  3. Face masks are cost-effective and straightforward strategies for controlling school outbreaks.
  4. Schools should form partnerships with peers, local health facilities, and community groups to support additional resources.

Where did this Rapid Response come from?

This document was created in response to a specific question from a policymaker in Uganda. It was prepared by the Center for Rapid Evidence Synthesis (ACRES) at the Uganda country node of the Regional East African Community Health (REACH) Policy Initiative

+ Included:

- **Key findings** from research
- **Considerations about the relevance** of this research for health system decisions in Uganda

✕ Not included:

- Recommendations
- Detailed descriptions

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Short summary

Background: On January 10, 2022, all schools in Uganda reopened after almost two years. The reopening of the schools coincided with the peak of the third surge of the Severe Acute Respiratory Corona virus-2 (SARS-CoV-2) attributed to the Omicron variant. However, schools continued to operate without interruptions, and the surge has since been declared over. The mitigation strategies in schools include vaccination of adults (≥18 years), hand hygiene practices, masking, temperature screening, and physical distancing within classrooms and hallways. However, challenges, such as adherence to masking, poor availability of- and access to- resources, and different contexts make it difficult to implement the mitigation strategies.

Question: *What strategies should be considered to control the transmission of SARS-CoV-2 in schools in Uganda?*

Findings:

A. Strategies to control within school SARS-CoV-2 transmission of

1. Covid-19 vaccination
2. Physical interruption of the spread of SARS-CoV-2: i) mandating face masks, ii) hand hygiene practices, and iii) disinfecting facilities
3. Changes in the environment to reduce risk of spreading SARS-CoV-2: i) reducing class sizes, ii) enforce physical distancing, iii) ventilation
4. Testing strategies, e.g., regular or one-time testing and symptomatic screening.

B. **Additional considerations for adjusting and/ or complementing mitigation strategies**

- Where applicable, vaccination is the recommended strategy for controlling within school transmission
- Determine clear and appropriate metrics for low, moderate, and high transmission periods and colour-coded policies to prioritise during these periods.
- Universal masking is a simple and cost-effective measure in managing within-school outbreaks during moderate to high transmissions.

Conclusion: Schools can effectively control transmissions of SARS-CoV-2 even during periods of moderate to high intensity without closing or isolating children. The Covid-19 is a dynamic and evolving context, and the best available evidence should inform approaches to controlling with-in-school transmissions. Where applicable Covid-19 vaccination is the recommended primary strategy for controlling transmission and is complemented by appropriate use of masks and testing strategies during periods of high community transmission.

Background

On January 10, 2022, all schools in Uganda reopened after almost two years (1). The reopening of the schools coincided with the peak of the third surge of the Severe Acute Respiratory Corona virus-2 (SARS-CoV-2) that started in December 2021 was attributed to the Omicron variant (2). Schools were closed within three months after the first efforts to reopen due to a second surge of cases and deaths attributed to the delta variant. Newer variants, such as alpha, delta, and omicron, have had increased spread and caused more severe disease than the original wild type. However, schools continued to operate without interruptions, and the surge has since been declared over.

How this Rapid Response was prepared

After clarifying the question being asked, we searched for systematic reviews, local or national evidence from Uganda, and other relevant research. The methods used by the SURE Rapid Response Service to find, select and assess research evidence are described here: www.evipnet.org/sure/rr/methods

Reports of adverse effects of school closures during the Covid-19 pandemic include, e.g., learners experiencing interrupted learning, drop in quality of learning, sexual violence, exploitation, teenage pregnancies, growth retardation, and poor nutrition (3). Also, the teachers lost income, and some abandoned the teaching for other jobs (4). Although closing schools might have contributed to a decline of the outbreak in Countries, education authorities are concerned about more school closures having irreversible effects on learning outcomes and quality.

The current strategy for controlling SARS-CoV-2 transmission in schools includes vaccination of adults (≥18 years), hand hygiene practices, masking, temperature screening, and physical distancing within classrooms and hallways. Adherence to the strategies is effective in controlling SARS-CoV-2 transmission within schools. However, the context of schools in Uganda is different from the several studies from Western countries. For example, first, there is a high pupil-to-teacher ratio in classrooms; second, schools do not have enough resources for physical distancing; third, the costs of water, alcohol rubs, masks, or regular testing are prohibitive (5). Although teachers were a priority group in the Covid-19 vaccination program, there has been a low uptake of the vaccines in the group(6). These issues raise concerns for a decision in Uganda of whether the current strategies would effectively control within-school transmissions.

Rapid response question

What strategies should be considered to control the transmission of SARS-CoV-2 in schools in Uganda?

Summary of findings

Two years since the Covid-19 pandemic started, the strategies to control transmission within schools have been adjusted and adapted to the evolving context of the pandemic (7). Initially, the assumptions of transmissions informed the implementation of several strategies. However, several countries have since reported on their experiences and experiments, which have adjusted the strategies.

The summary of findings includes current evidence on the mechanism of transmission, strategies, and additional considerations for adjusting strategies (8).

A. Mechanism of transmission in schools

The airborne transmission of SARS-CoV-2 is the dominant transmission mechanism (9). An infected person exhales aerosols filled with viral particles ballistically during respiratory activities, such as coughing, sneezing, singing, speaking, laughing, and even breathing (10). Respiratory aerosols of different sizes are expelled and behave differently. Larger aerosols settle quickly on surfaces under gravity, and smaller ones travel further and remain suspended for longer durations, especially in poorly ventilated rooms (10). Also, when acted upon by humidity, larger respiratory aerosols can become smaller droplet nuclei in a poorly ventilated room.

However, transmission in schools is much lower than in the local communities, and children are less affected when mitigation strategies are in place (11, 12). Older children and staff have a more considerable respiratory effort and are more likely to spread SARS-CoV-2 than younger children (13).

B. Strategies to control with-in school transmission of SARS-CoV-2

The mitigation strategies to control with-in school transmission can be categorized as below:

1. Covid-19 vaccination	**2. Physical strategies to interrupt the spread of SARS-CoV-2** - Mandating face masks in schools - Mandating hand hygiene practices - Disinfecting facilities, such as cleaning surfaces and buildings
3. Testing and screening strategies - Regular testing, e.g., random - and one-time testing. - Symptom screening	**4. Changes in the environment to reduce the risk of spreading SARS-CoV-2.** - Reducing class sizes, e.g., using cohorts and hybrid classes - Enforcing physical distancing - Reducing contact with the external community. - Cleaning the air through improved ventilation and/or filtration.

1. Covid-19 vaccination

Covid-19 vaccination is the recommended strategy for preventing and controlling transmission within schools for several countries (14, 15). Vaccines are safe and effective in preventing infections and hospitalizations even for more transmissible variants, e.g., the Pfizer mRNA vaccines reduced the risk of delta variant infection in adolescents and children by probably 10-fold.

The following should be considered in the policies targeting vaccination in children and

- Objectives for including children and adolescents in the vaccination program, e.g., some country programs included children to improve uptake when the stock of vaccines increased to surpass current consumption (16). However, it was important for other countries to prevent severe disease and hospitalisation, even when children were much less affected than adults. In other situations, it was essential to prevent severe forms of the disease, such as multisystem inflammatory syndrome (MIS-C), long Covid (16, 17), and hospitalisation of children, even when children were much less affected compared to adults.
- Parental consent is an essential influence on vaccination uptake among children and adolescents (18). It is essential to establish a context-specific mechanism in getting parental consent. In addition, vaccine hesitancy in older children should not be underestimated (18).
- Safety of the vaccines in the age group is about the rare adverse effects in the community, e.g., myocarditis reported in children. However, it is essential to note that the risk of myocarditis is xx-fold more with SARS-CoV-2 infection.
- Considerations for delivery include the age group, healthcare professionals, and the logistics supply chain. The initial vaccinations targeted 12-17 years because there were no trials in younger children. However, currently children. Also, there should be considerations of available human resources to provide the vaccination and supply chain to ensure the vaccines are accessible. School-based and/or outreach delivery of vaccines can be considered to improve access (19).
- Periods of low community transmission should be an opportunity to implement strategies to improve vaccination coverage and address reasons community reasons for not up taking the virus

2. Physical strategies to interrupt the spread of SARS-CoV-2

a) Mandating face masks, such as medical/surgical masks, filtering face-piece (FFP) respirators, or N95 (20, 21). Universal face masking or covering effectively controls with-in-school transmissions when most learners and teachers were using the fit and appropriate face masks, especially during moderate to high community surges (11, 22, 23).

The following showing should be considered to ensure the effectiveness of facemasks in schools.

- When adopted early and used continuously, face masks were also associated with a reduced likelihood of closing childcare programs (24).
- Staff members, visitors, and children aged >2 were required to use appropriate and fit masks. For

example, in Germany, children in kindergarten were required to use face masks during community surges (25).

- Perceptions of teachers and parents negatively influenced the use of masks, such as face masks being disruptive, a barrier in communication, and reading emotions (26-29). However, although this has become a talking point for advocacy against masks, evidence shows that masks do not affect emotions, reading, and expressions (30).
- Other concerns include interference with breathing in children, especially while running. However, the feeling of breathlessness is subjective and does not pose a danger to a child's health during moderate exercises (30, 31).
- Implementing, monitoring, and motivating adherence to face masks on school campuses was at administrators' discretion but with on-spot visits from researchers and authorities (11, 22, 32).
- The use of masks will likely drop during certain periods, e.g., low community transmissions or simply loss of interest (25). However, masking can still be implemented during these periods. The administrators engaged students and teachers to improve adherence, such as on-spot training when students and/or staff are not found or inappropriately using face masks (32).
- Masks are especially effective in controlling within-school transmission during moderate to high community transmissions. This might probably be necessary to minimize the risk of school closure and reduce lost time.
- The tolerance and ability of children with special needs, e.g., epilepsy and autism, has been explored should also be considered (33). The children who could not tolerate masks were provided face shields (22).

b) Hand hygiene practices include handwashing soap and disinfectants, such as 60% ethanol or 70% isopropanol, hydrogen peroxide, and antiseptic hand washes (34, 35).

Initially, strategies to prevent transmission of SARS-CoV-2 favoured the mechanism of respiratory droplets falling on hands and surfaces, such as hand hygiene practices (34, 36, 37). Laboratory-controlled studies showed that alcohol rubs, water, and soap effectively inactivated the SARS-CoV-2 cell membrane.

However, efforts to promote hand hygiene practices should consider the following:

- Efforts to promote hand hygiene practices should be standard because face masks effectively control within-school transmissions of SARS-CoV-2 (38).
- Hand hygiene practices effectively reduce absenteeism due to other acute respiratory illnesses and gastro-intestinal diseases, e.g., reducing diarrhea episodes in children under five years (37, 39, 40).
- Strategies to reinforce hand hygiene behavior and respiratory etiquette include demonstrating behavior, instructing how to perform handwashing, adding facilities in different places within the school environment, information about social and environmental consequences, and the importance of the consequences (41).

- Other factors affecting access to-and uptake of handwashing include centralization of facilities, utility costs, and socio-economic factors of the children, such as parental guidance and background.

c) Disinfecting facilities using chlorine-based disinfectants, alcohol-based (ethanol >60%), fumigating, UV radiation, and hydrogen peroxide (42). The following should be considered when planning for disinfecting surfaces:

- Cleaning and disinfection efforts should be deescalated to standard practice with the available resources. Although disinfectants might be effective, these cannot be used alone. Disinfecting surfaces have to be done in combination with face masks (23, 43).
- Increased frequency of disinfecting is probably essential in reducing the risk of transmission if there is reduced contact and use of face masks (23, 43). However, it probably will not be sufficient in Kindergartners.
- Concerns about students using the disinfectants without supervision would expose them to poisonous material and potential health effects (44). There are reports of adverse effects of disinfectants, such as increased skin irritation or breathing difficulties, that negatively affect the use, e.g., at least two of every three people get skin rashes (45).
- Fumigation poses health hazards but can only be used in the presence of an infectious source (44).

3. Testing strategies

Testing in schools was an essential barrier to an early reopening of schools in Uganda. The specific objectives for testing included (i) early identification of cases among students and staff, to support contact tracing and initiate other mitigation strategies, (ii) identification of students and staff at high risk of developing the severe disease due to underlying conditions, (iii) support investigations and studies concerning the role of children in the transmission of Covid-19 (46).

Testing strategies in schools could be summarized through the following ways (46):

1. Screening, e.g., regular or one-time. Several studies have shown that testing can only be helpful if done frequently and regularly (*daily, weekly, or monthly) to identify cases and contact tracing or once to create bubbles or cohorts. Testing can be done on a random sample of learners in a class or a random sample of classes in a school. More transmissible variants have increased challenges to testing, such as increased costs as more children and staff are tested but controlling the transmission becomes difficult.
2. Symptom screening. The approach involves regular assessment of symptoms of students and teachers to identify the potential symptomatic cases. The potential cases are then tested, and contacts follow the same approach. However, earlier practices, such as temperature screening, are ineffective and inaccurate in identifying potential cases.

The following issues should be considered when identifying an appropriate testing approach (46-49).

- Case ascertainment and/or contact tracing in schools involve using accessible and affordable Covid-10 diagnostic testing and rapid turnaround time, such as rapid diagnostic tests, pooling of samples, and or using saliva-based rapid diagnostic tests.
- Follow-up action: Isolating or quarantining children and adolescents if cases increase in the schools and community would be challenging to implement because of lost time in school. Closing a school or isolating children for five to ten days could be highly disruptive (50). The virulence of the virus determines the number of isolation days, e.g., omicron requires 5 to 7 days of isolation while delta variant ten days. It might not be necessary to isolate or quarantine contacts in schools (50).
- Accuracy of the tests: The higher the sensitivity of the tests, the more effective a testing strategy will be, e.g., tests with 80% sensitivity and over could reduce the cumulative incidence by at least 95%.
- Turnaround time: The turnaround time would affect the effectiveness of the test results. Providing the test results on the same day has reduced the number of positive cases. The delays before test results are available can reduce testing effectiveness because the primary goal of testing is to identify and isolate potential viral vectors and those in close contact with them
- Costs of the tests: The administrators are often pessimistic about the tests and their accuracy because of the financial costs and logistics. It is necessary to consider approaches such as pooling samples or simple to use rapid tests, such as saliva-based tests. More children, i.e.,>1000, would need to be tested to identify one case if transmissions are low.
- Absenteeism in schools: Concerns of stigma parents are concerned about discomfort during sample collection and stigma. However, students are more willing to take the tests if they go back to school, although teachers worry that students will lose time in the curriculum if they are positive and asymptomatic. If there is low public acceptance of mass testing, any suggestions to test children in schools will cause push back or withdrawals from school.
- Privacy and confidentiality: It is likely that when sick students are isolated and contacts quarantined, they will be known to have tested positive.
- Children with special needs: Considerations of the type of test, e.g., saliva-based rapid tests, to reduce discomfort and anxiety among children with special needs.
- Frequency of the tests: Increasing the number of tests each week can reduce the number of cases but is not as effective as daily tests for less than the whole class per week.

3. Changes in the environment to reduce the risk of spreading SARS-CoV-2

Changes to the school environment are needed to reduce crowding and improve ventilation within buildings (13, 51). The strategies complement other strategies, especially during periods of moderate to high within-school transmission to interrupt the development of clusters.

The strategies are summarised below:

a) Reducing the class sizes might involve cohorting students in alternating schedules and/or hybrid classes.

The following should be considered if and when it is possible to reduce class sizes:

- Reducing class sizes might be unnecessary and lead to more school hours loss.
- Reducing contacts between students probably reduces the total infection rate among students and staff, e.g., less than 7 to 18 per 100 students and 10 to 25 per 100 staff members were infected depending on the level of community transmission (23). Also, cohorting students probably reduces the size and likelihood of school outbreaks in the presence of other mitigation strategies (52).
- Reducing class sizes increases the days lost for learners and staff, which is unnecessary. Uganda has a wide range of classroom sizes Uganda depending on the region and type of school. After nearly two years, schools and policymakers might consider the number of students enrolled as a more meaningful indicator.

b) Enforcing physical distancing in schools, e.g., splitting playtime, creating more classrooms with smaller group sizes. The following should be considered when enforcing physical distancing:
   - Strategies of enforcing physical distancing reduce the likelihood of an outbreak (23, 51). However, the distance between students, 3ft versus 6ft, does not seem to influence the risk of infection (53).
   - Schools were encouraged to use the outdoors for vigorous activities, such as sports and dancing, as much as possible.
   - It is crucial to identify the hotspots in schools, e.g., playgrounds. Studies show high-school students involved in contact sports were at least twice as likely to be infected compared to others.
   - Innovations, such as customised tents with heat and ventilation, have also been used. However, there are concerns about their scale-up to disadvantaged areas.
   - Concerns of mental health and growth development should be addressed, especially children with special needs. Children are likely to develop mental health issues when stopped from social interactions with others for a long time (8).

c) Reducing random contacts between individuals probably reduces the risk of transmission compared to reducing repeated contacts, e.g., in boarding schools. (54, 55). The schools, especially "day-schools," have had different drop-off and pick-up procedures. For example, clear and visible guidance on drop-off and pick-up. Discouraging parents from staying around longer. In other examples, the schools banned visitors from campuses.

d) Cleaning the air in buildings, e.g., natural air ventilation and/or air filtration applied in a building's heating, ventilation, and air conditioning system (HVAC). The following considerations should be made:
   - Generally, the longer the ventilation/hour, the lower the risk of infection in an occupied building (13). For example, using air filters in a room with an infectious person for 2 hours reduces the inhaled dose of particles by a factor of 6 (23).
   - Natural ventilation alone reduces the risk, but it is less effective than air filters or combinations (13, 56).

- Seasons probably influence the risk of infection, e.g., increases in colder seasons, because windows are often closed (13, 57).
- The cost of air filters in HVAC is a concern for the majority of the schools in low- and middle-income countries and might not be feasible in the short term.

C. Additional considerations for adjusting/ and or complementing mitigation strategies

The Covid-19 pandemic is a dynamic and evolving context. The transmission in schools is often lower than that of the local communities and might not affect community transmission (12, 58). Initial strategies were primarily based on non-pharmaceutical strategies, informed mainly by the transmission of respiratory droplets that fall on surfaces or hands. Airborne transmission is the dominant and might be supplemented by other modes of transmission, such as surfaces and feaces (59, 60). It is essential to consider the available information and context for more pragmatic and effective approaches to controlling within-school transmissions.

The following additional considerations are necessary for decision-making concerning controlling transmission within schools.

i. Vaccination of children and staff is the most effective strategy in controlling transmission (61-63). The level of vaccine coverage primarily influences considerations for adjusting mitigation measures. For example, it might be possible to reduce the masking mandate in condition vaccine coverage is more than 70% even in moderate to high community transmission situations (64).

ii. The level of community transmission can either be described as low, moderate, or high (47). However, there is no consensus of what informs low, moderate, or high transmission in different countries. In some places, 15 cases per 1000,000 people can be considered low or moderate depending on the country (47).

iii. The level of community transmission also influences behavior in the communities and schools. Schools are more likely to ignore certain measures, such as universal masking or physical distancing during low community transmission, especially in low community transmission(25, 65). It is advisable to have color-coded actions for what policies to prioritize during the different scenarios (as shown below)

Table 2: Priority policies during the different community transmission scenarios.

Level of transmission	Vaccination	Universal masking	Hand hygien practices	Ventilation (natural)	Physical distar measures.	Reducing cla sizes	Testing
Low							

Moderate							
High							

Key

High priority	Moderate priority	Low priority

iv. Adherence to masking is essential for controlling transmissions event during moderate to high community transmissions. In situations of high adherence, masks probably reduce transmissions (in moderate to high transmissions) by more than 75 times, compared to when there is low adherence, 10% (23, 32).

v. During periods of low transmission, it is essential to focus on measures to reinforce the prevention messaging, such as training and ongoing reinforcing of standard operating procedures (SOPs) and mitigation measures with caregivers, teachers, and other staff members: Training is essential to improve the effectiveness of disinfectants, e.g., in a study, with ≥6,000 participants, two of every three staff reported not receiving training on the safety and effective use of products, such as temperature screening and did not know how they worker (45).

vi. Schools should consider partnerships and collaborations with peer networks, health facilities, healthcare practitioners, or community groups for additional resources. For example, schools formed partnerships with researchers and healthcare practitioners to train, provide the latest evidence, and test the students and staff.

Other measures to improve adherence include:

- Flexible policies, such as medical leave policies, work hours, and staggered shifts, will encourage teachers with illnesses to seek treatment instead of exposing others in the school.
- Incentives to adhere to mitigation strategies**,** e.g., recognition of students and staff, might probably influence behaviour to wear masks or hand hygiene.
- Ability to monitor and restock supplies, e.g., personal protective equipment, alcohol-based rubs staff needs personal protective equipment, e.g., medical/surgical masks in good supply. Clear responsibility for staff to monitor the use of supplies and ensure it is restocked in time.

Conclusion

Schools can control increased levels of transmissions of SARS-CoV-2 effectively without learners losing time in school. The Covid-19 pandemic is a dynamic and evolving context influenced by the potential spread of a variant like delta or omicron. Vaccination of learners and teachers is the most effective strategy in controlling transmissions, and considerations for prioritising a non-pharmaceutical strategy should be informed by if children and staff are vaccinated and the coverage. Universal masking is a cost-effective and straightforward non-pharmaceutical strategy in controlling within-school transmissions, even during periods of moderate to high transmissions. Also, it is essential to assess the available resources, seek partnerships, and plan for a testing strategy during increased community transmissions.

: https://acres.or.ug

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What is Rapid Response?

Rapid Responses address the needs of policymakers and managers for research evidence that has been appraised and contextualised in a matter of hours or days, if it is going to be of value to them. The Responses address questions about arrangements for organising, financing and governing health systems, and strategies for implementing changes.

ACRES – The Center for Rapid Evidence Synthesis (ACRES) is a center of excellence at Makerere University- in delivering timely evidence, building capacity and improving the understanding the effective, efficient and sustainable use of the rapid evidence syntheses for policy making in Africa. ACRES builds on and supports the Evidence-Informed Policy Network **(EVIPNet) in** Africa and the Regional East African Community Health **(REACH)** Policy Initiative (see back page). ACRES is funded by the Hewlett and Flora foundation.
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ACRES' collaborators:

REACH
Regional East African Community Health Policy Initiative

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EVIPNet

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Glossary

of terms used in this report:
www.evipnet.org/sure/rr/glossary

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Conflicts of interest

None known.

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